## REMARKS

I. Introduction

In response to the Office Action dated January 6, 2005, no claims have been cancelled, amended or added. Claims 1-10, 12-25 and 27-30 remain in the application. Re-examination and re-consideration of the application is requested.

II. Prior Art Rejections

A. The Office Action Rejections

On page 2 of the Office Action, claims 1, 3-6, 13-16, 18, 20-21, 28-30 were rejected under 35 U.S.C. §103(a) as being unpatentable over Tayloe et al., U.S. Patent No. 5, 095,500 (Tayloe) in view of Chang et al, U.S. Patent No. 5, 890,067 (Chang). On page 5, of the Office Action, claims 2, 4, 7-10, 17, 19, 22, & 23-25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Tayloe and Chang further in view of Montoya, U.S. Patent No. 6,400,943 (Montoya). On page 10, of the Office Action, claims 12 and 27 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Tayloe and Chang further in view of Bell et al, U.S. Patent No. 6,115,762 (Bell).

Applicants respectfully traverse these rejections.

B. The Applicants' Independent Claims

Independent claims 1 and 16 are generally directed to operating a wireless network. Claim 1 is representative and comprises:

(a) collecting and analyzing information from the wireless network into a collection and analysis system, wherein the information includes location information on mobile transceivers operating within the network; and

(b) optimizing the wireless network's operation from a network control system by intelligently forming radio frequency (RF) signal beams using the collected and analyzed information.

C. The Tayloe Reference

Tayloe describes a system and method of evaluating the radio coverage of a geographic area serviced by a digital cellular radiotelephone communication system is described which comprises a plurality of base stations each having a transmitter and a receiver and a plurality of mobile units having co-located transmitters and receivers for transmitting and receiving communication message

signals between the base stations and a mobile unit. During operation, the position of at least one of the mobile units operating within the geographic area is located when a call is received by a base station. The base station monitors the signal quality of the call and collects information relevant to the actual performance of the communication system. The mobile unit location and corresponding signal quality data are passed from the base station to a central operation and maintenance unit which collects the data, performs all necessary analytic and arithmetic computations, and provides a user-friendly representation of the characteristics of the radio coverage. With this representation of the radio coverage characteristics, the system operator can quickly and efficiently diagnose coverage deficiencies and take the necessary corrective action. By continuously monitoring subscriber calls and updating the pictographic representations, the system operator can actually observe the effect of the adopted modifications in a pseudo real-time fashion.

D. The Chang Reference

Chang describes cells in a radio telephone scheme that are covered by beam-spots generated by multi-beam antenna system. Forward communication channels follow mobile units as they move between beam-spots. Additionally, each cell is divided into zones based on the mobile traffic patterns within the cell. Typically, there will be a high density zone covered by many, small area beam-spots, a medium density zone covered by two or three medium sized beam-spots, and a low density zone covered by one large beam-spot. As the mobile traffic patterns change throughout the day, multi-beam antenna dynamically reconfigures the zone and beam-spot layout for each cell, thereby keeping a nearly optimal zone and beam-spot configuration despite varying mobile traffic patterns.

E. The Montoya Reference

Montoya describes a system and method that uses an advanced positioning system in combination with a cellular communication network to improve the performance of the network is disclosed One embodiment of the network includes a mobile switching center (MSC), a location tracker system (LTS), and a plurality of base stations for serving at least one mobile unit in the network. The LTS is able to receive a location code from the mobile unit that represents a specific coordinate, or location, in the network. The mobile unit may have generated the location code by analyzing its position from a global positioning satellite, or by other means. The LTS stores the

location code in a data base. Whenever the MSC needs to communicate with the mobile unit, it queries the database of the LTS to determine the last location of the mobile unit. The MSC then selects one of the base stations that serves the location of the mobile unit and establishes a cellular link therethrough.

F. The Bell Reference

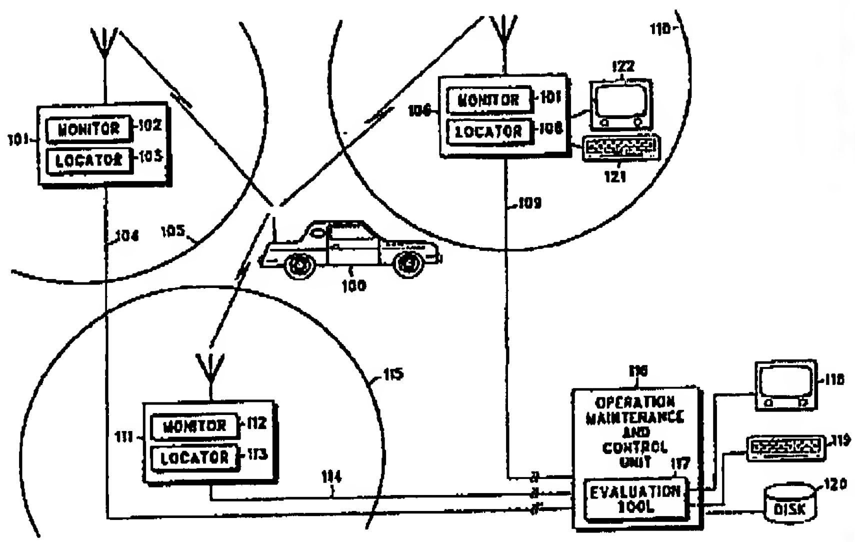
Bell describes a computing device, such as a laptop personal computer (PC), a desktop PC, or a personal information device (PID), that includes an antenna embedded therein for wireless communications. The antenna may be formed on a printed circuit board installed in the computing device. The antenna may include multiple radiating and receiving elements for mitigating multipath effects and/or responding to steering circuitry to form a directed antenna beam.

G. The Applicants' Invention is Patentable Over the References

The Applicants' invention, as recited in independent claims 1 and 16 is patentable over the references, because it contains limitations not taught by the references. Specifically, the references do not teach or suggest the specific combination of limitations comprising: "collecting and analyzing information from the wireless network into a collection and analysis system, wherein the information includes location information on mobile transceivers operating within the network," and "optimizing the wireless network's operation from a network control system by intelligently forming radio frequency (RF) signal beams using the collected and analyzed information."

The Office Action, however, asserts that that combination of Tayloe and Chang teaches these limitations. However, Applicants' attorney respectfully disagrees. At the indicated locations, the Tayloe and Chang references do not teach or suggest these aspects of the Applicants' invention. Instead, at the indicated locations, the Tayloe and Chang references merely state the following:

Tayloe: FIG. 1




Tayloe: Col. 5, lines 25-39

As base stations 101, 106, and 111 communicate with device 100, information concerning the mobile unit location and the resultant signal quality is gathered and passed along lines 104, 109, or 114 to the Operation Maintenance and Control Unit (OMCU) 116. The OMCU is a centralized management tool within the communication system which supports the basic operation and maintenance functions required by each serviced base station. Via the terminal 119 and the CRT display 118, a system operator can access base station 101, 106, or 111 and alter various system parameters such as: transmitter power, transmitter frequency, frequency assignments, or software algorithms. In addition the OMCU provides the mass storage 120 and necessary computing power to support these operations.

Tayloe: Col. 5, lines 53-65

When corrective actions are required, the system operator can initiate previously mentioned alterations from the OMCU. Hardware specific alterations like: increasing or decreasing antenna height, adding additional base stations, utilizing omni or directional antennae, or varying antenna shaping must be performed in the field. Upon completion, continuously monitoring subscriber calls within the affected area allows the evaluation tool to update the graphical representations for that areas. These updates, in turn, enables the system operator to quickly and efficiently evaluate the effectiveness of proposed solutions, and make additional changes as required.

Tayloe: Col. 3, lines 51-60 (actually, lines 51-65)

Mobile unit distances are ascertained from timing advance information. Timing advance is the round trip propagation time of a call travelling from the base to a mobile unit and back. From this information, the mobile unit's distance from the base is calculated. Once the mobile unit's distance from the base is known,

mobile unit bearing is approximated by monitoring the signal strength levels of adjacent cells for omni-directional antennae, or adjacent sectors for sector-directional antennae. In order to track the position of a mobile unit, both the bearing and the distance data are collected and recorded at periodic rates. Refer to Maloney et. al. U.S. Pat. No. 4,728,959 and Sanderford et. al. U.S. Pat. No. 4,799,062 for examples of viable radiolocation techniques.

Chang: Col. 5, line 40 – col. 6, line 11

FIG. 5 is a diagram illustrating the hierarchy of cell division in the preferred embodiment of the present invention. At the top level are cells 502 divided into one or more zones 504. Zones 504 are further divided into beams 506. Beams 506 each have several channels 508 assigned to individual mobiles. In the preferred embodiment, the beams do not track the mobile units in real time as conventional adaptive antenna systems. Instead, the mobile unit's channel follows it as it moves through the beams. However, the beams are "movable" in the sense that the system periodically reconfigures the arrangement of the beam-spots within a cell. The system may change the number of beam-spots, the size of the beam-spots, or the locations of the beam-spots. The system reconfigures the beams when the mobile unit densities in the cell change substantially to make reconfiguration desirable.

All of the beam-spots in zone 405 (FIG. 4) share the same control channel. Similarly, the beam-spots 421 and 422 share a second control channel and beam-spot 430 uses yet another control channel. A mobile unit moving into or out of a zone or cell performs a handoff with the new zone or cell. Because all of the beam-spots within a zone share the same control channel, no handoff is required for a mobile unit moving between beam-spots in a zone. Instead, the communication channel pair (the forward channel from the base station to the mobile unit and the reverse channel from the mobile unit to the base station) simply follows the mobile unit.

When the mobile unit is in a beam-spot, for example, beam-spot 412, the multi-beam antenna system transmits the forward channel to only beam-spot 412. As the mobile unit moves into a neighboring beam-spot, for example, beam-spot 409, the system senses that the reverse channel signal (the communication channel from the mobile unit to the base station) is stronger in this new beam-spot and consequently turns off the forward channel from beam-spot 412 and turns on the same forward channel signal to beam-spot 409. Thus, the system switches the transmitted channel between the beam-spots to follow the mobile unit.

Chang: Col. 6, lines 24-61 (actually, lines 20-61)

Although the above described channel-following technique works well in most situations, fast moving mobile units in high density areas may cause too many on/off channel switches for the system. FIG. 6 is a flowchart illustrating the preferred solution to this problem, which allows fast moving mobile units to move through beam-spots in a zone without repeated, rapid channel switches. For fast moving mobile units, the system must estimate the speed of each mobile unit based on the time interval between when the mobile unit enters a beam-spot and when it leaves that beam-spot (step 602). This time interval is called the mobile unit's dwell time. Whether the unit is a fast mobile depends on its dwell time (step 604). If the mobile unit's dwell time is below a predetermined threshold, the mobile unit is a fast mobile.

> If the mobile unit is not a fast mobile, the mobile unit may be a medium speed mobile (step 608). A medium speed mobile is a mobile unit whose dwell time is above the predetermined threshold but below a second, higher threshold.
>
> If the mobile unit is determined to be a fast mobile (step 604), the system estimates the direction of the mobile unit (step 606), based on its movement history, and turns on all the channels in the mobile unit's zone that the direction prediction step 606 predicts the mobile unit will travel through (step 607). For example, referring to FIG. 4, if a fast moving mobile unit enters beam-spot 410 from beam-spot 411, the system may turn on the traffic channels in beam-spot 407 associated with the mobile unit. At the same time, or at a later time, the system will turn off the corresponding channels in beam-spot 415. The traffic channels associated with the mobile unit in beam-spots 411, 410, and 408 remain activated from a previous operation. When the mobile unit exits beam-spot 410 and enters 408, the system will turn on its channel in beam-spot 406 and turn off its channel in beam-spot 411. The channel in beam-spot 407 remains on from a previous activation. Additionally, if the system determines that the mobile unit may enter beam-spot 409, it will turn on its channel in beam-spot 409. In this manner, the system switching load is decreased--reducing the hardware required and increasing reliability.

Thus, in Tayloe, information concerning the mobile unit location and the resultant signal quality is gathered and passed to the Operation Maintenance and Control Unit (OMCU), which supports the basic operation and maintenance functions required by each serviced base station. In Chang, beams are "movable" in the sense that the system periodically reconfigures the arrangement of the beam-spots within a cell when the mobile unit densities in the cell change substantially to make reconfiguration desirable. However, nothing in either reference refers to intelligently forming RF signal beams using collected and analyzed location information on mobile transceivers operating within the wireless network.

In addition, nothing in either reference suggests that the references may be combined in the manner suggested by the Office Action. Instead, the suggestion is provided by the Office Action itself, which indicates that the suggestion relies on impermissible hindsight.

Moreover, even when combined, the references would not teach or suggest all the elements of Applicants' claimed invention. For example, Tayloe only suggests changing the hardware configuration of a base station in response to gathered information, but not intelligently forming RF signal beams using the location information of mobile units, while Chang only suggests reconfiguring the arrangement of beams based on the density of mobile units, but not based on the location of mobile units.

Finally, the various elements of Applicants' claimed invention together provide operational advantages over Tayloe, Chang, Montoya, and Bell. In addition, Applicants' invention solves problems not recognized by Tayloe, Chang, Montoya, and Bell.

Thus, Applicants submit that independent claims 1 and 16 are allowable over Tayloe, Chang, Montoya, and Bell. Further, dependent claims 2-10, 12-15 and 17-25, 27-30 are submitted to be allowable over Tayloe, Chang, Montoya, and Bell in the same manner, because they are dependent on independent claims 1 and 16, respectively, and thus contain all the limitations of the independent claims. In addition, dependent claims 2-10, 12-15 and 17-25, 27-30 recite additional novel elements not shown by Tayloe, Chang, Montoya, and Bell.

## III. Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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G&C 139.136-US-U1